NOTES.

Reports from Kansas state that farm and building operations progressed uninterruptedly during the month. Early peaches, pears, plums, and apricots were in blossom, and shade trees were leafing at the close of the month.

The Reclamation Record for April, 1910, reports the Kansas Garden City Project (98 per cent completed): "The work on the Garden City Project during the month of March consisted of overhauling the machinery in the power plant and pump houses and preparing it for an indefinite period of disuse."

Mr. Charles F. Rudolph, of Rociado, N. Mex., states: "Unusually warm weather during the month melted the snow in the mountains and the streams were all running full, diminishing summer water supply."

Tulia, Tex., reports a hard freeze on the 31st. As a rule, farmers smudged their orchards, thereby saving some thousands of dollars.

In Arkansas the weather was ideal for outdoor work. Navigation on the Arkansas River was practically suspended after March 17 on account of low water.

SMUDGE POTS FOR THE PREVENTION OF FROSTS, WICHITA, KANS.

By RICHARD H. SULLIVAN, Local Forecaster.

The inclosed series of observations were taken for the benefit of members of the Sedgwick County Horticultural Society and others in connection with the frost warnings of March 30 and April 5 and tests of Troutman smudge pots in the 1-acre orchard of Mr. Albert Kunkel, in Wichita, on March 31 and April 6, and in a selected plat of the orchard of the Thomas Orchard Company, 3 miles west of Wichita, on April 6. The readings for the Kunkel orchard on March 31 and the Thomas orchard on April 6 were made by the writer, 2 minimum and 5 exposed thermometers, 1 anemometer, and 1 commercial thermometer being used.

On Mr. Kunkel's place 79 pots to the acre were used on March 31 and 70 pots to the acre on April 6; his fruit is still unharmed. In the Thomas orchard 50 pots to the acre, or 500 pots in all, were used among Jonathan and Grime's golden apple trees. Unfortunately, the temperature in the latter orchard could not be kept above freezing after 4 a. m. on account of lack of fuel oil. The small number of pots to the acre made it necessary to run them at nearly full capacity, and in order to carry the heat through to sunrise the lighting was delayed until 2 a. m. However, the manager does not consider his loss as great as in some orchards in the vicinity.

The figures show that with from 70 to 80 pots to the acre a fruit crop can be saved when the temperature falls to 25°, or even to 22°, if the work is done thoroughly and systematically. These are the first known practical tests of this character that have been made in this vicinity, and the whole proposition rests upon the question of how much expense for such insurance the investment can stand and still render a profit.

Where artificial methods of prevention of damage were not used during the freezes of March 31 and April 6, especially in the lowlands, there was general loss of apricots, peaches, plums, pears, and a very large proportion of apple buds, making the third series of disastrous spring frosts in 4 years. Last year the whole fruit tree crop was killed by a single freeze during the night of April 30–May 1, warning of which was given the day before.

There is now a general disposition among local horticulturists to adopt the methods of commercial fruit growers elsewhere to prevent damage by frosts and freezes, and the belief is steadily growing that the warnings of this service must be heeded if loss is to be avoided.

Comparative temperature, wind velocity, and weather readings made by the writer in connection with test of central-draft smudge pots for prevention of damage by frost or freezing in the orchard of Albert Kunkel, No. 734 South Washington street, Wichita, Kans. Half-hourly observations were taken from midnight of March 30–31 to 7:30 a. m., March 31. The arrangement and height of the various instruments are indicated by the letters in the diagram and the explanation herewith. The smudge pots, 79 in number, were lighted between 5:30 and 5:45 a. m., March 31, and extinguished at 7:30 a. m. The temperatures at 6 a. m. in the accompanying table show the effectiveness of such a method during frosty periods. Fuel oil, costing 4 cents per gallon, was used.

Winds—Northwesterly to 2:30 a. m.; northerly to 6:30 a. m.; northeasterly to 7:30 a. m.

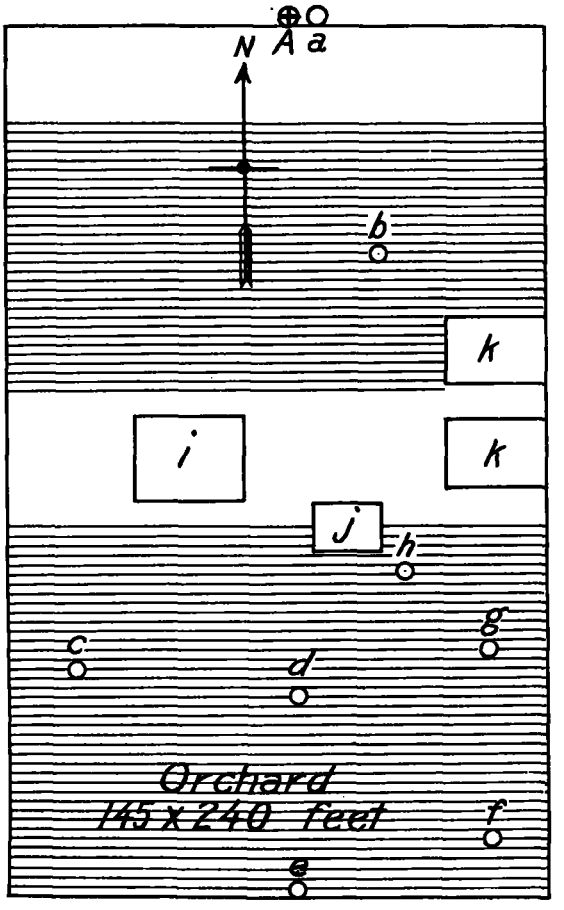

FIG. 1.

Shaded areas show limits of smudge pots.

A—Weather Bureau anemometer, 5 feet above ground.

a—Weather Bureau minimum thermometer No. 6733, 3 feet 8 inches above ground.

b—Weather Bureau standard thermometer No. 4403, 4 feet 9 inches above ground.

c—Weather Bureau standard thermometer No. 4788, 4 feet 9 inches above ground.

d—Weather Bureau standard thermometer No. 4789, 4 feet 9 inches above ground.

e—Weather Bureau minimum thermometer No. 9436, 3 feet 8 inches above ground.

f—Weather Bureau standard thermometer No. 3135, 4 feet 9 inches above ground.

g—Weather Bureau standard thermometer No. 5671, 4 feet 9 inches above ground.

h—Commercial thermometer, 1 foot above ground.

i—Residence.

j—Greenhouse.

k—Barn.

Comparative temperature, wind velocity, and weather readings made by the writer in connection with test of central-draft smudge pots for prevention of damage by frost or freezing in the orchard of the Thomas Orchard Company, 3 miles west of Wichita. The smudged portion of the orchard was a selected 10-acre plat containing Jonathan and Grime's golden apples; the pots were arranged 50 to the acre, or 500 in all. The instruments were placed at a height of 6 feet, except 1 commercial thermomter, which was located 1 foot above the ground near the center. The thermometers are arranged in the table in the order of reading. The pots were charged with 3 quarts of fuel oil, and lighting was delayed until 2 a. m. on account of lack of oil. The 500 pots were lighted between 2 and 2:35 a. m., and insufficient oil to hold the fires at reasonable capacity resulted in inability to keep temperature above freezing after 4 a. m., and by daylight practically all of the oil had been consumed.

Winds—Northwesterly to 4:30 a. m.; westerly after 4:30 a. m.

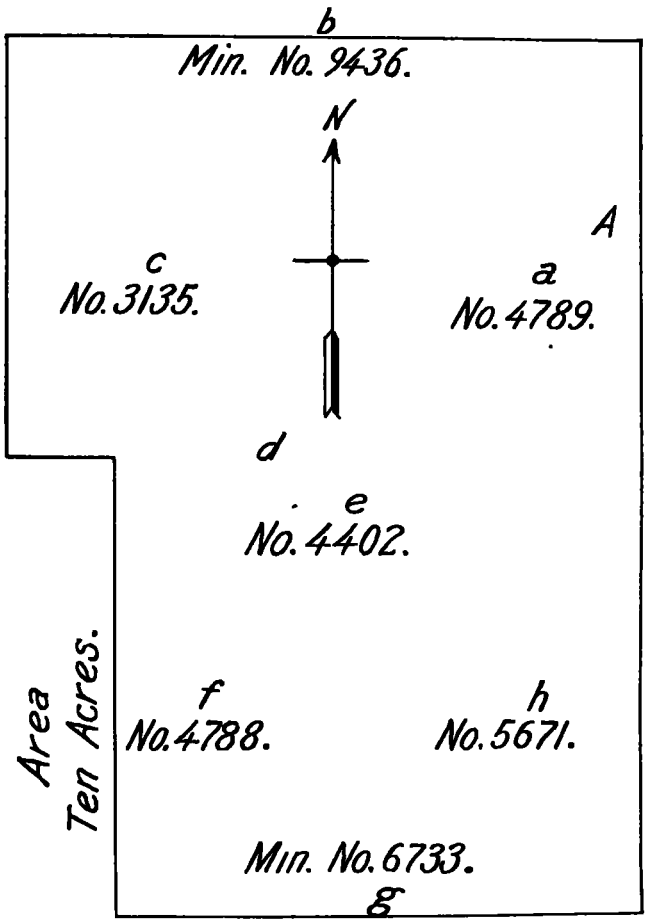

FIG. 2.

Letters indicate corresponding instruments in table.
Numbers indicate United States Weather Bureau thermometers.
d—Commercial thermometer.
A—Anemometer.

TABLE 1.—*Temperature, weather, and wind velocity.*

[Letters in heading indicate position of thermometers.]

Time.	*a*	*b*	*c*	*d*	*e*	*f*	*g*	*h*	Weather.	*A*
	°	°	°	°	°	°	°	°		*Miles.*
12:00 midnight	39.0	40.5	41.0	41.0	39.0	41.0	40.5	39.0	Clear.	0.2
12:30 a. m.	38.5	40.0	39.5	39.5	38.5	39.5	39.5	38.0	Clear	0.2
1:00 a. m.	36.5	38.5	38.0	38.0	37.0	38.5	38.5	37.0	Clear.	0.2
1:30 a. m.	35.5	37.5	37.0	37.0	36.0	38.0	37.5	36.0	Clear.	0.2
2:00 a. m.	35.0	37.0	37.0	36.0	35.5	36.0	36.0	34.5	Clear.	0.3
2:30 a. m.	34.0	36.0	35.5	35.5	34.0	35.5	35.5	34.0	Clear.	0.3
3:00 a. m.	35.5	37.0	37.5	37.0	36.0	37.5	37.0	35.0	Clear.	0.4
3:30 a. m.	36.0	37.0	39.0	39.0	37.0	38.5	38.0	36.0	Clear.	0.5
4:00 a. m.	36.5	37.0	36.5	36.0	35.5	37.0	37.0	36.0	Clear.	0.3
4:30 a. m.	35.5	36.5	36.0	36.0	35.0	36.5	36.0	35.0	Clear.	0.3
5:00 a. m.	33.0	34.0	33.5	33.0	33.0	34.0	33.0	31.0	Clear.	0.2
5:30 a. m.	*31.0	32.5	32.5	32.0	†31.5	33.0	33.0	30.0	Clear.	0.2
6:00 a. m.	31.0	44.0	40.5	38.0	34.0	38.0	38.0	36.0	Clear.	0.3
6:30 a. m.	33.0	39.0	40.0	38.5	34.5	37.5	38.0	38.0	Clear.	0.4
7:00 a. m.	35.5	38.0	38.0	37.5	35.5	38.0	39.0	38.0	Clear.	0.5
7:30 a. m.	40.0	40.5	41.0	41.0	40.0	40.5	40.5	40.0	Clear.	0.5

* Lowest temperatures recorded, 30.5° between 5:00 and 5:30 a. m.
79 smudge pots lighted, beginning at 5:30 a. m. and ending at 5:45 a. m.

Second test made by Mr. Albert Kunkel, No. 734 South Washington Street, Wichita, Kans. Number of pots lighted, 70.

TABLE 2.—*Temperature and weather table.*

[Letters in heading indicate location of thermometers as shown on diagram of March 31, 1910.]

Time.	*a*	*b*	*e*	Weather.
	°	°	°	
3:00 a. m.	30	32	.....	Clear.
3:30 a. m.	28	31	.....	Clear.
4:00 a. m.	27	34	.....	Clear.
4:30 a. m.	26	35	.....	Clear.
5:00 a. m.	26	36	.....	Clear.
5:30 a. m.	27	36	37	Clear.
6:00 a. m.	28	38	38	Clear.
6:30 a. m.	28	35	38	Clear.
7:00 a. m.	30	38	38	Clear.

70 smudge pots lighted, beginning at 3.30 a. m.

TABLE 3.—*Temperature, weather, and wind velocity.*

[Letters in heading indicate position of thermometers.]

Time.	*a*	*b*	*c*	*d*	*e*	*f*	*g*	*h*	Weather.	*A*
	°	°	°	°	°	°	°	°		*Miles.*
12:00 midnight	31.5	31.5	32.0	31.5	32.0	31.0	31.0	31.0	Clear.	0.2
1:00 a. m.	31.0	31.0	31.0	32.0	31.5	31.0	31.0	30.5	Clear.	0.2
2:00 a. m.	30.0	*30.0	30.0	30.0	30.0	29.5	31.5	29.5	Clear.	0.1
3:00 a. m.	33.5	33.5	33.5	35.0	34.0	33.5	34.5	33.0	Clear.	0.1
4:00 a. m.	32.5	32.0	32.5	32.0	32.5	32.5	33.5	32.0	Clear.	0.1
5:00 a. m.	31.0	31.5	31.0	31.5	30.5	29.0	30.0	30.0	Clear.	0.2
6:00 a. m.	31.0	30.0	30.0	30.0	30.0	29.0	29.0	28.5	Clear.	0.1

* Lowest temperature recorded, 29.0° between 1:00 and 2:00 a. m.
500 smudge pots lighted, beginning at 2:00 a. m. and ending at 6:35 a. m.

Additional report. April 30, 1910.

Further trials in the Thomas orchard on April 19, 24–25, fully confirm the efficacy of the firing methods above explained in detail. The wind-velocity records show, as was to be expected, that the most damaging temperatures occur after the wind has died down. Artificial preventive methods can be used effectively despite the oft-repeated arguments that it is too windy in Kansas.